PRS: Physics Reconstruction and Selection
HCAL/JetsMET group

Di-jet mass with LOSS = 2 vs 1 in CMSIM120

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GEANT Parameter LOSS

GEANT parameter: LOSS

1 **Continuous energy loss with generation of δ-rays above DCUTE (common /GCUTS/) and restricted Landau fluctuations below DCUTE.**

> → **Default for HCAL in CMSIM123 with DCUTE=1MeV.**

2 **Continuous energy loss without generation of δ -rays and full Landau-Vavilov-Gauss fluctuations. In this case the variable IDRAY is forced to 0 (i.e. no δ-ray production) to avoid double counting of fluctuations.**
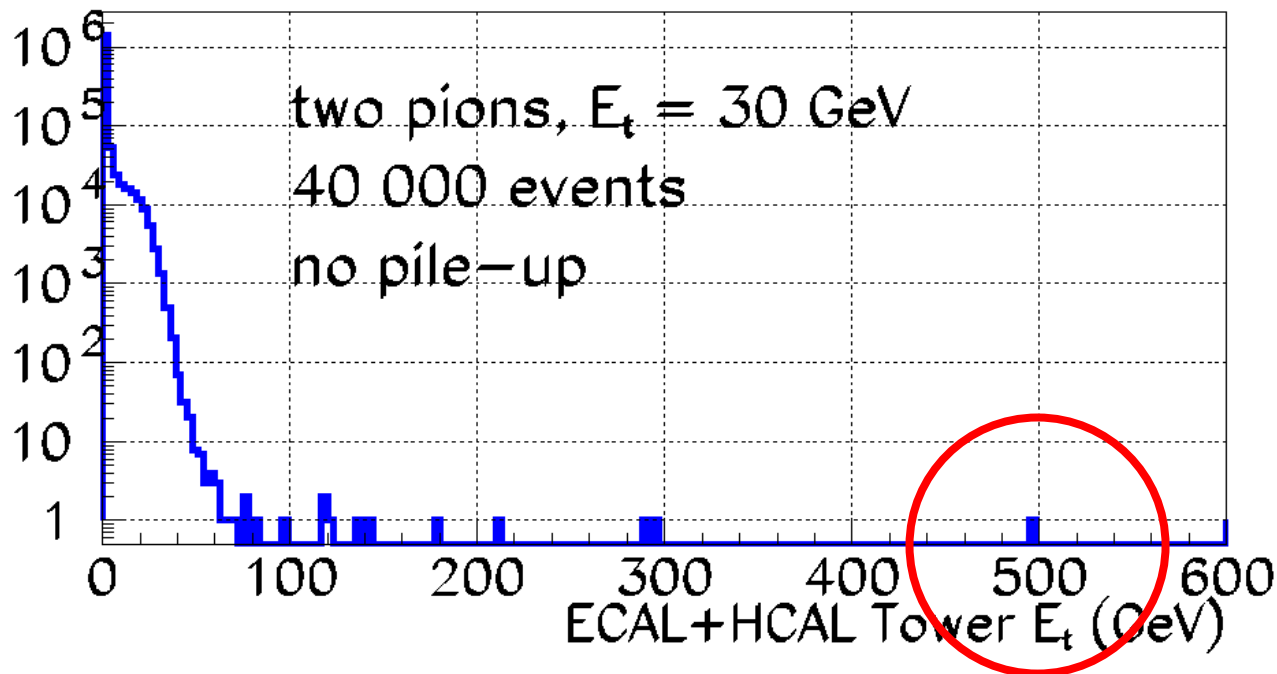
> → **Default for all detectors through CMSIM122.**
> → **Default for detectors outside HCAL in CMSIM123.**

Response to Single Pion

two pions, E_t = 30 GeV
40 000 events
no pile-up

**CMSIM120
LOSS=2**

ECAL+HCAL Tower E_t (GeV)

Event at 500GeV is obviously unphysical.

GEANT deposited 5GeV in a scintillator tile. The energy loss was supposed to be due to production of a δ-ray at that point, and δ-ray would exit from the scintillator and dump most of energy in absorbers.
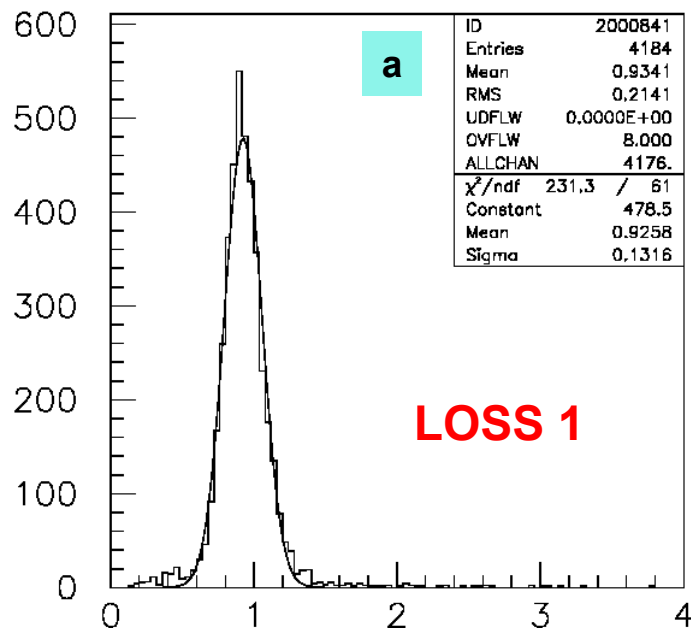
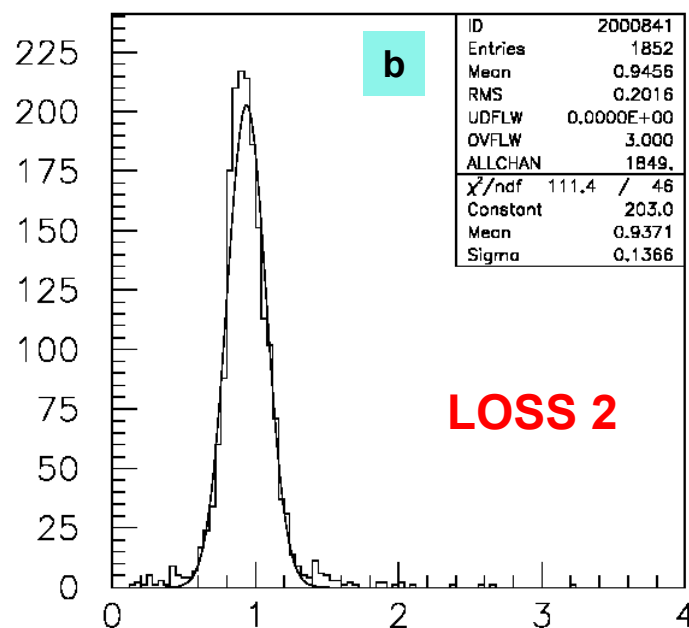**In CMSIM-ORCA,   5GeV x (sampling weight ~ 100) = 500GeV!**
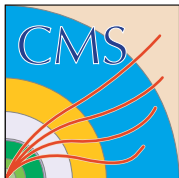
Di-jet mass for Z'(120)

(Weimin Wu, Pal Hidas)

Z'(jj) mass with FULL Detector

LOSS	σ(%)	% in >3
1	14.5	0.3%
2	14.2	0.2%

No difference
In mass resolution!

(Above result was obtained with F77 code for jet reconstruction. ORCA produced consistent result , 14.9%.)

Beyond mass resolution

What do we know now?

1. Salavat looked at jets in HLT sample (CMS120) and did not find clearly unphysical events in jets.

2. Pal looked at MET vs. Pt-hat in HLT sample (CMS120) and did not find clearly unphysical events.

3. We continue to look for clear unphysical events in HLT sample.

4. We will check correlation between MET direction and "unphysical jet" in HLT sample.

5. 100K min-bias events have been produced with LOSS=1 for comparison.

6. Future production (CMS123 and later) will use LOSS=1 in HCAL.